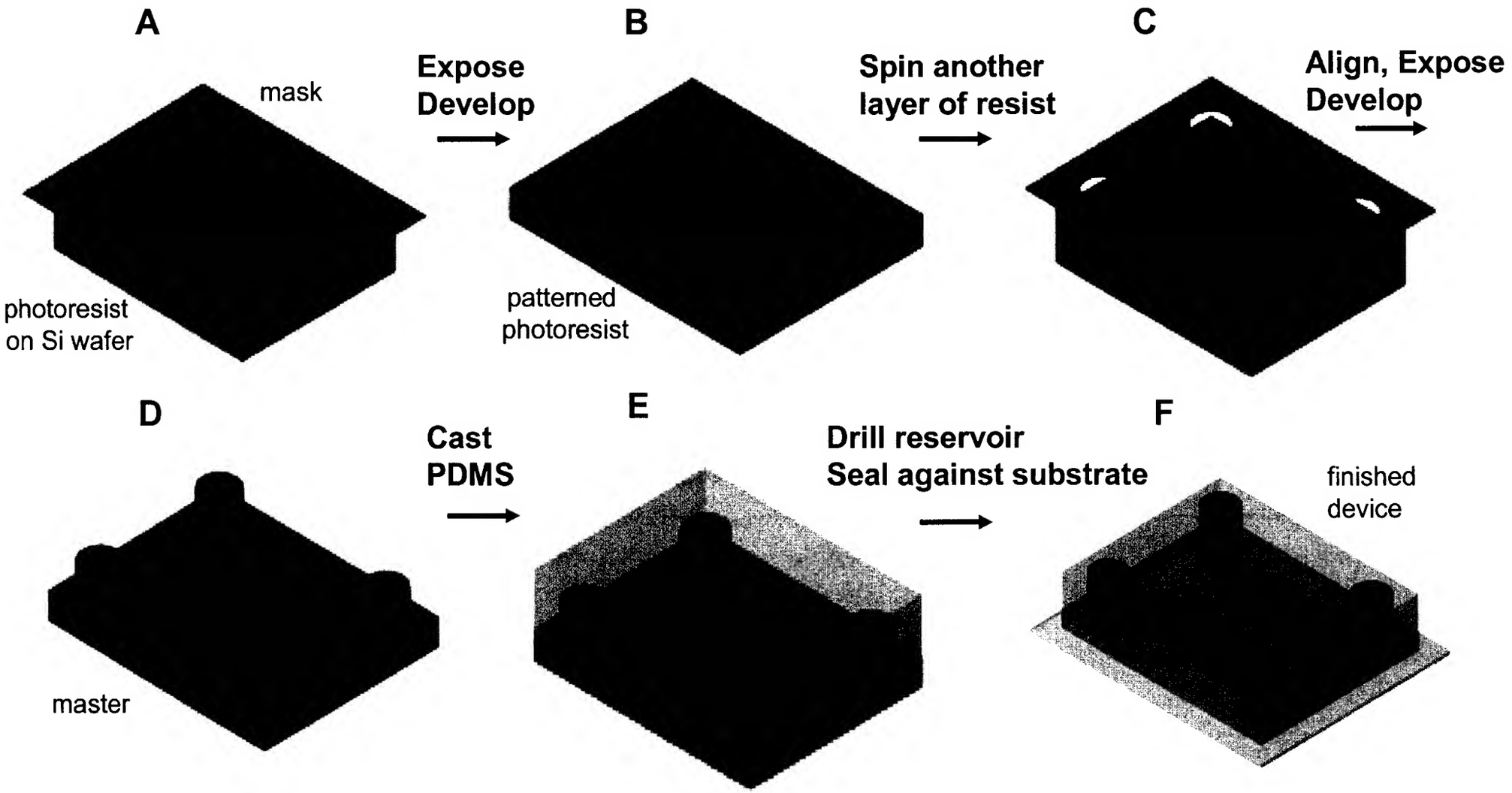
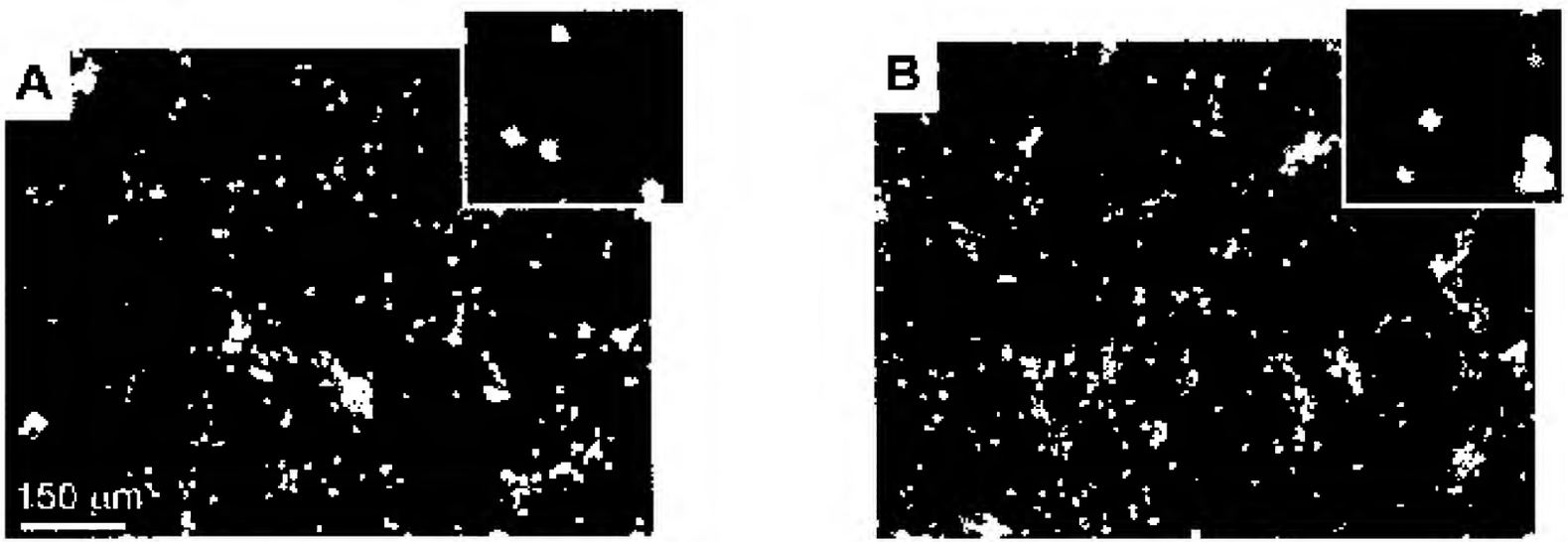

A
mask
photoresist
on Si wafer
Expose
Develop
B
patterned
photoresist
Spin another
layer of resist
C
Align, Expose
Develop
D
master
Cast
PDMS
E
Drill reservoir
Seal against substrate
F
finished
device

Figure 1


A
150 μm
B

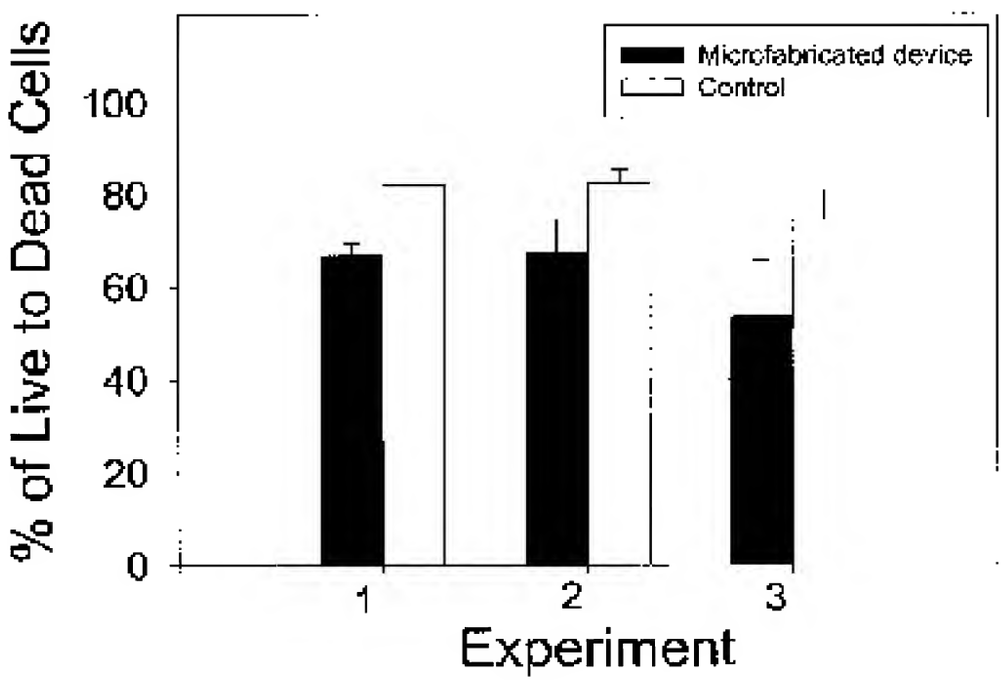

Microfabricated device
Control
% of Live to Dead Cells
100
80
60
40
20
0
1
2
3
Experiment

Figure 2

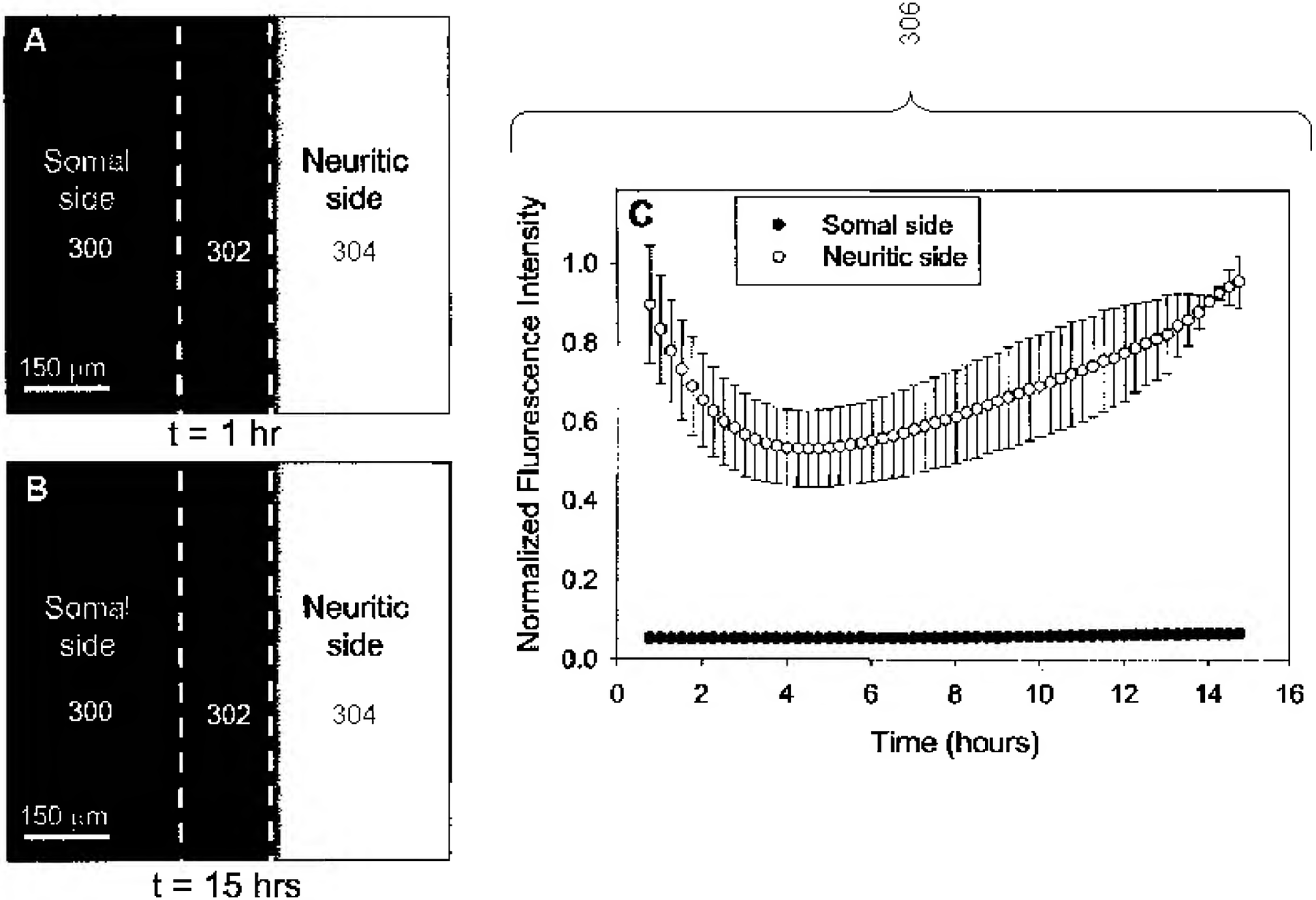
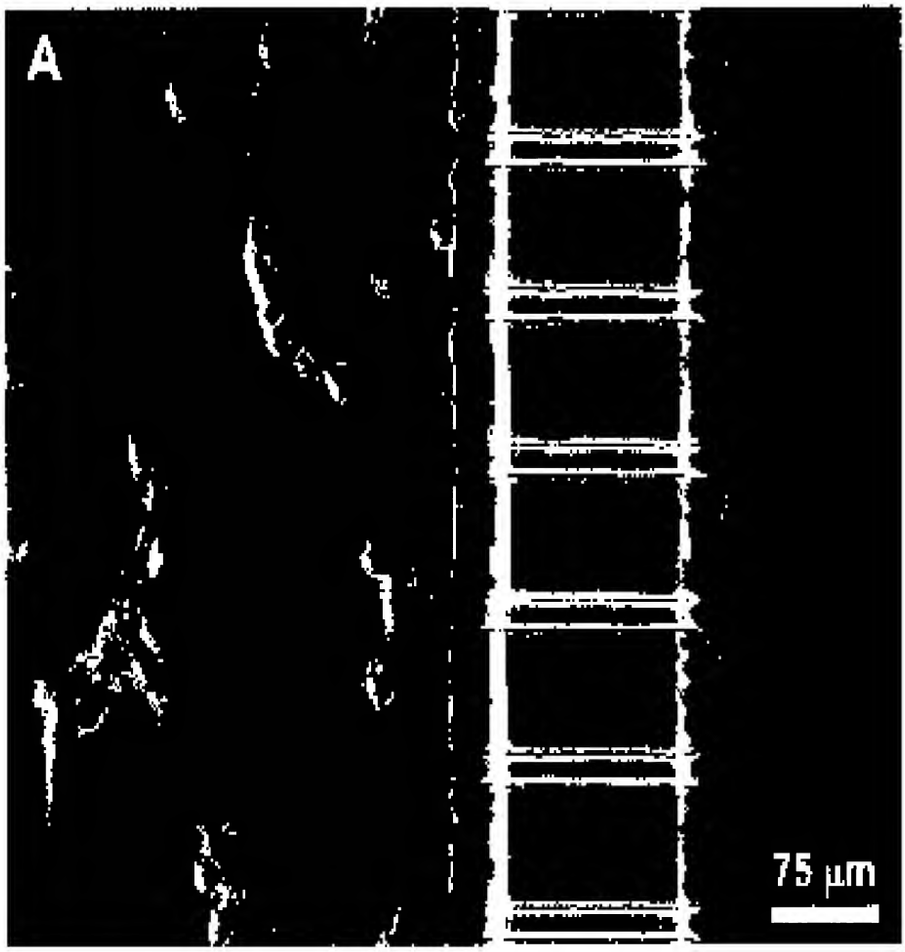

A
Somal side
300
302
Neuritic side
304
150 μm
t = 1 hr
B
Somal side
300
302
Neuritic side
304
150 μm
t = 15 hrs
306
C
Somal side
Neuritic side
Normalized Fluorescence Intensity
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
10
12
14
16
Time (hours)

Figure 3



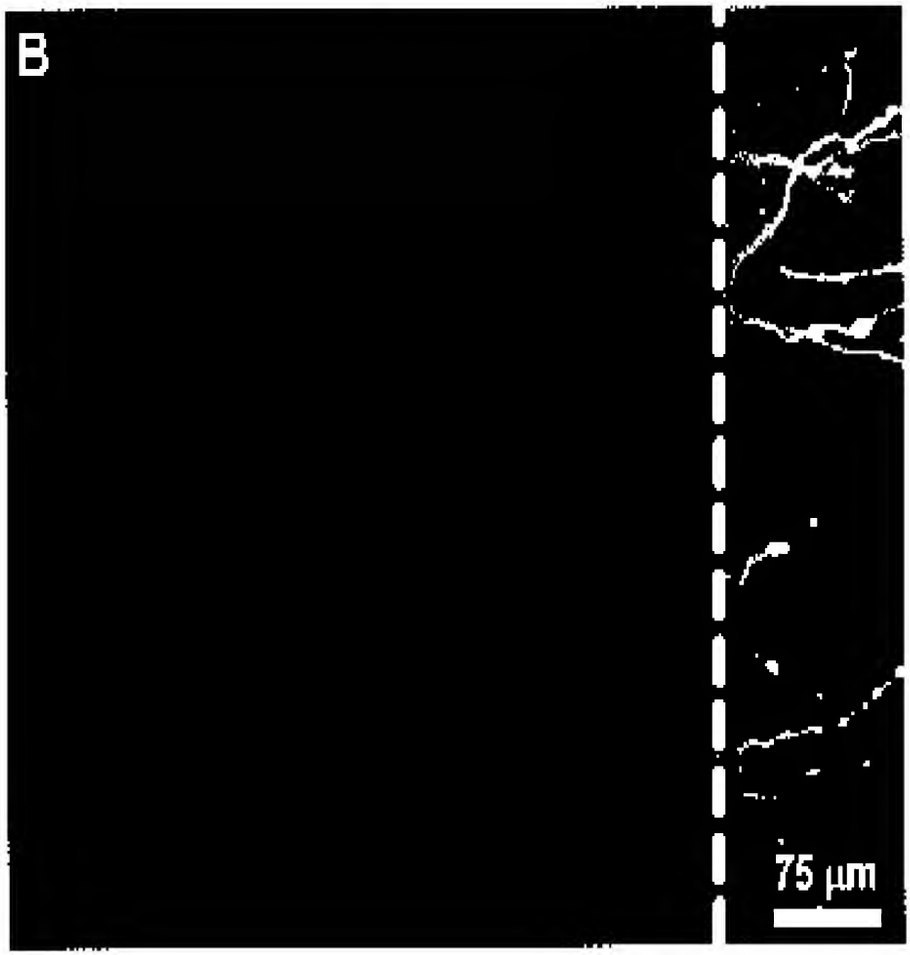




Figure 4

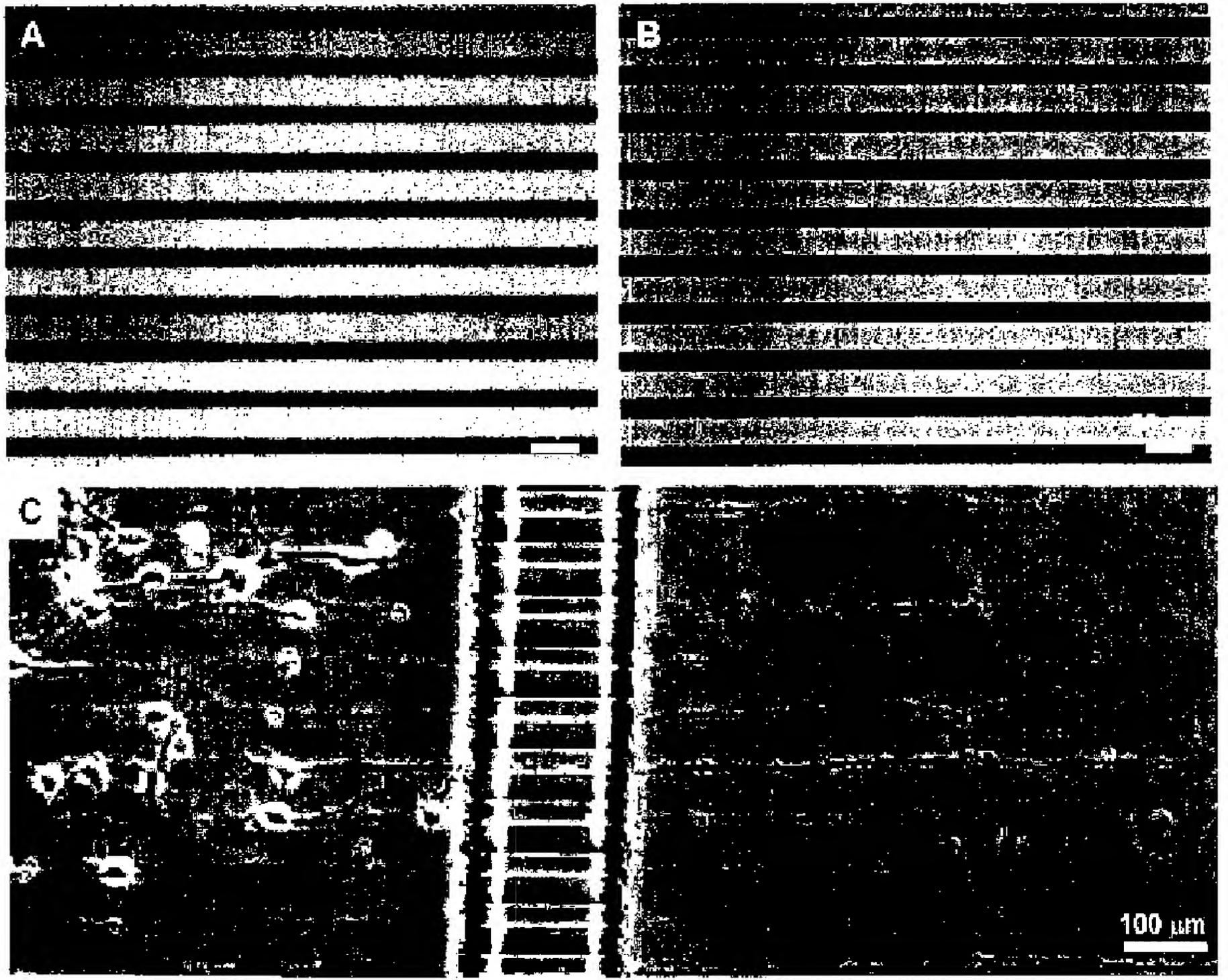



Figure 5

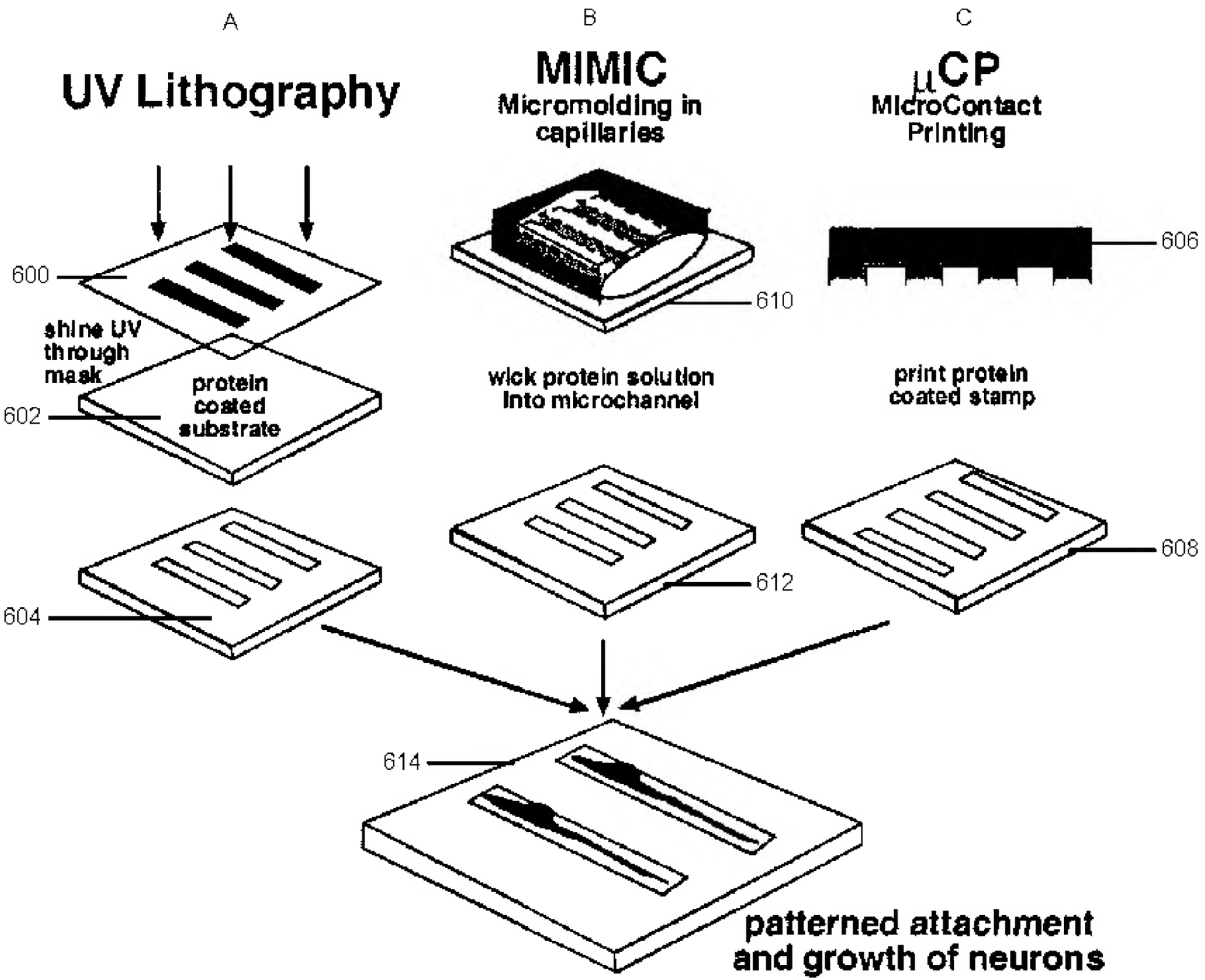

A
B
C
UV Lithography
MIMIC
Micromolding in capillaries
μCP
MicroContact Printing
600
shine UV through mask
protein coated substrate
602
610
606
wick protein solution into microchannel
print protein coated stamp
608
612
604
614
patterned attachment and growth of neurons

Figure 6

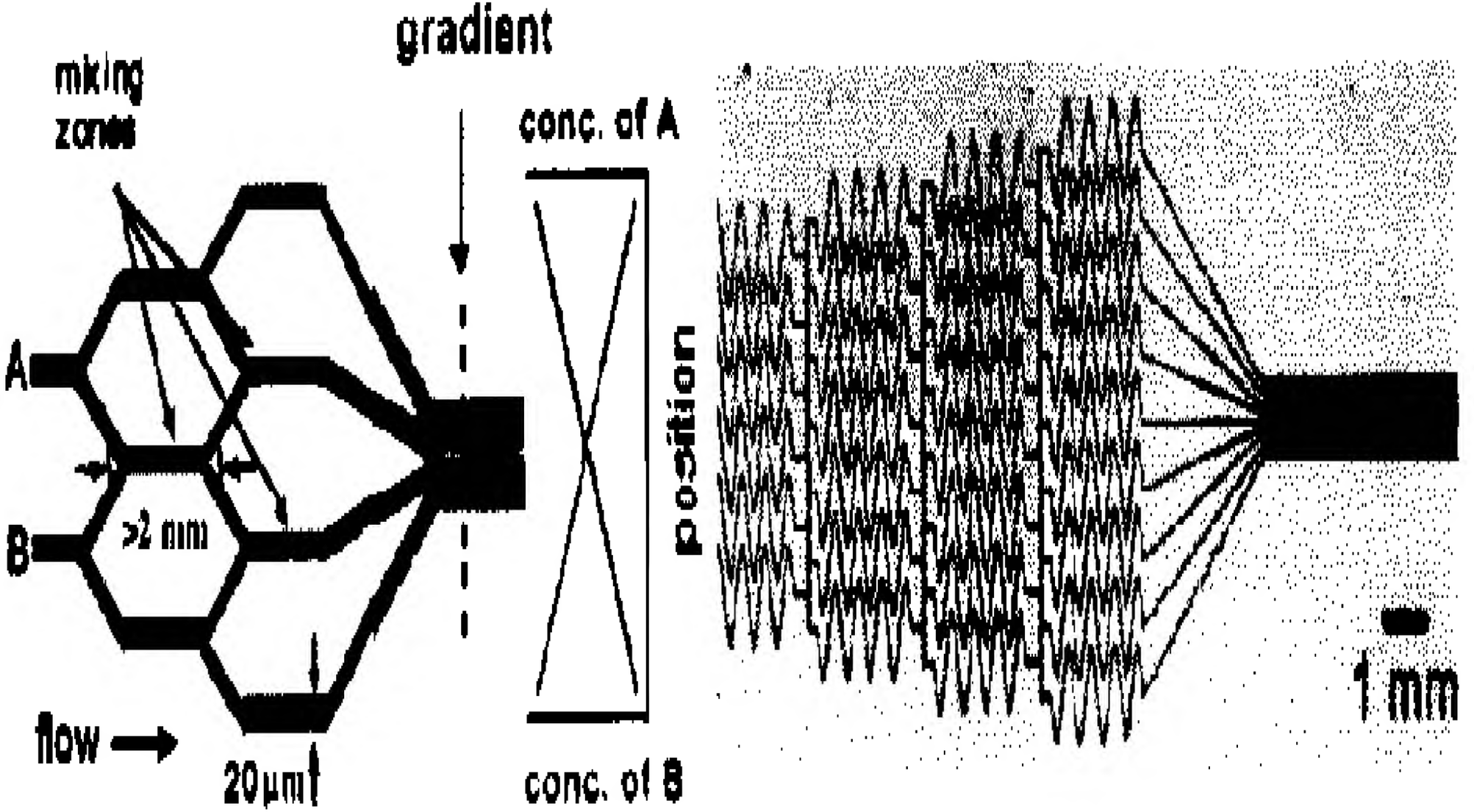

gradient
miking zones
conc. of A
A
B
>2 mm
flow
20µm
conc. of B
position
1 mm

Figure 7

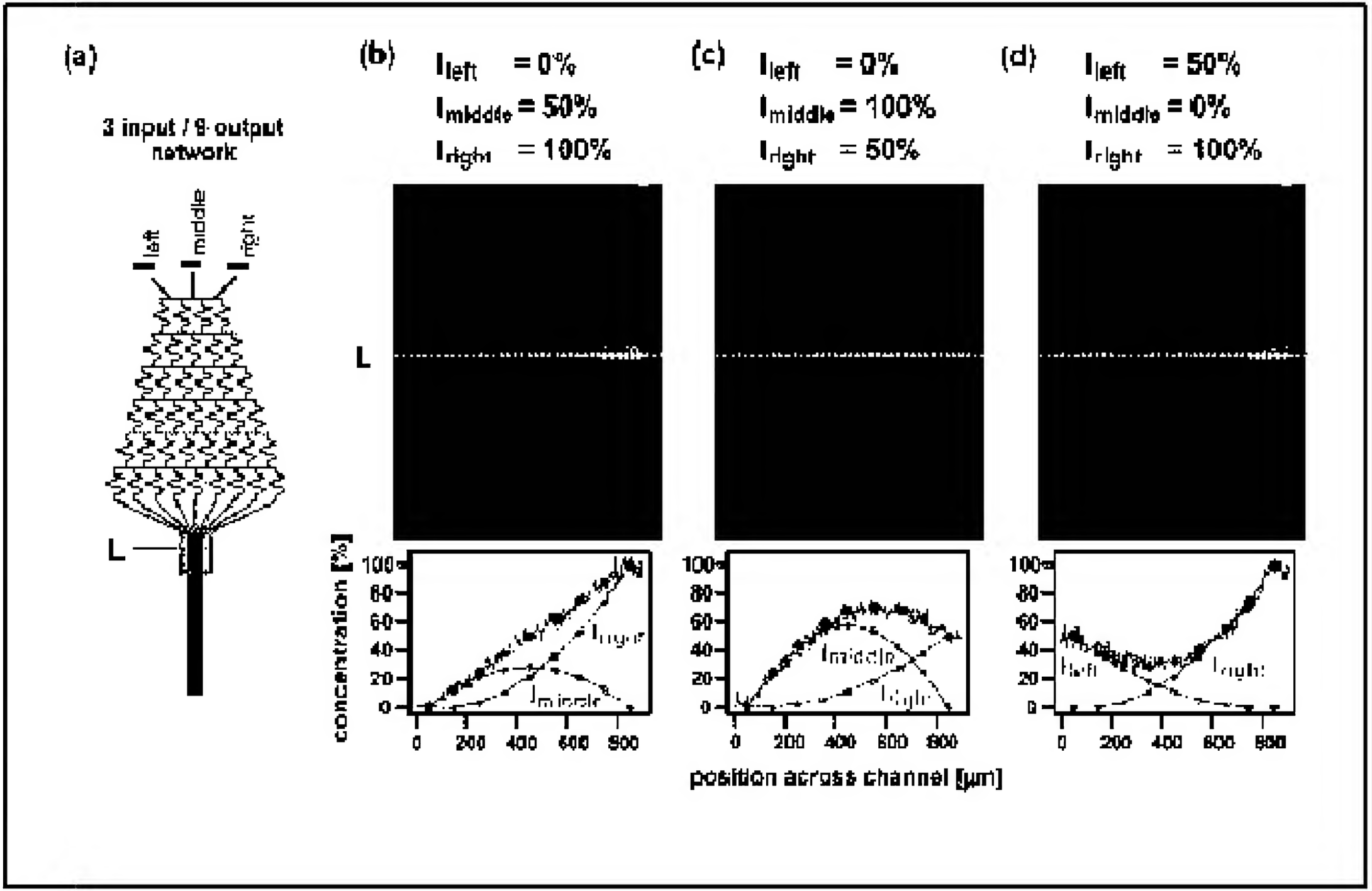

(a)
3 input / 9 output network
left
middle
right
L
(b)
I left = 0%
I middle = 50%
I right = 100%
(c)
I left = 0%
I middle = 100%
I right = 50%
(d)
I left = 50%
I middle = 0%
I right = 100%
L
concentration [%]
position across channel [µm]
0
20
40
60
80
100
0
200
400
600
800

Figure 8

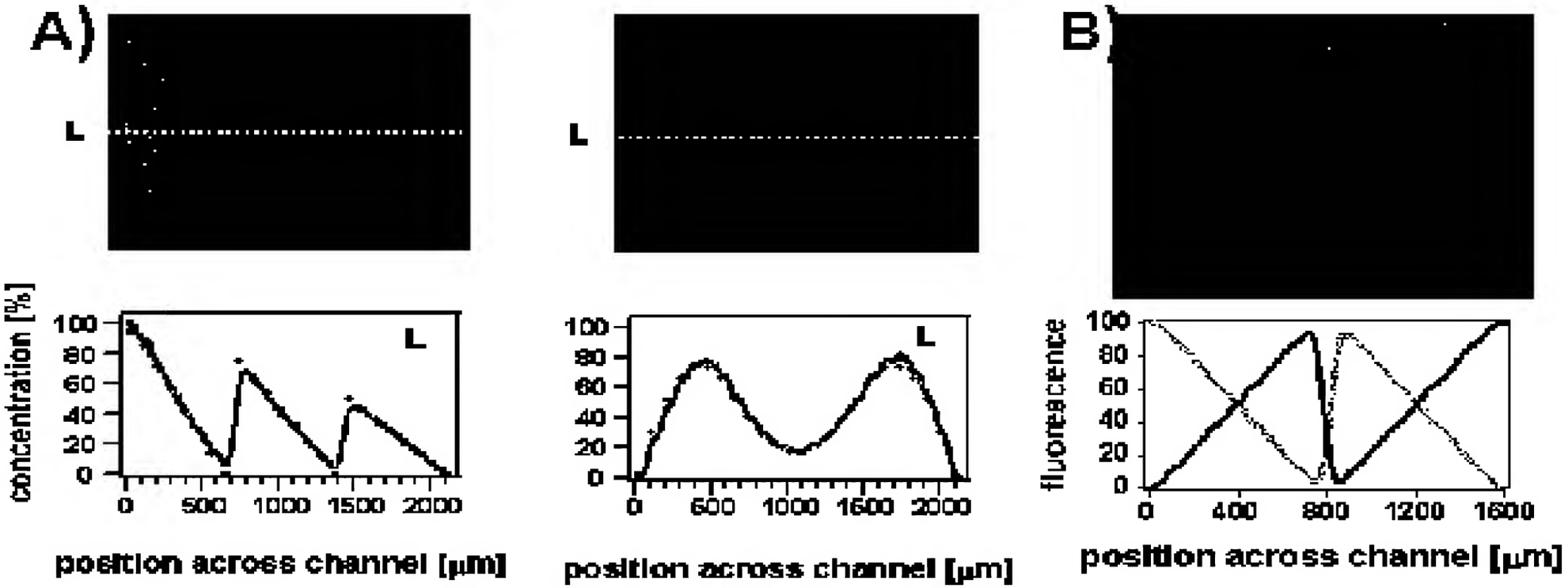

A)
L
concentration [%]
100
80
60
40
20
0
0
500
1000
1500
2000
L
position across channel [µm]
L
100
80
60
40
20
0
0
600
1000
1600
2000
L
position across channel [µm]
B)
fluorescence
100
80
60
40
20
0
0
400
800
1200
1600
position across channel [µm]

Figure 9

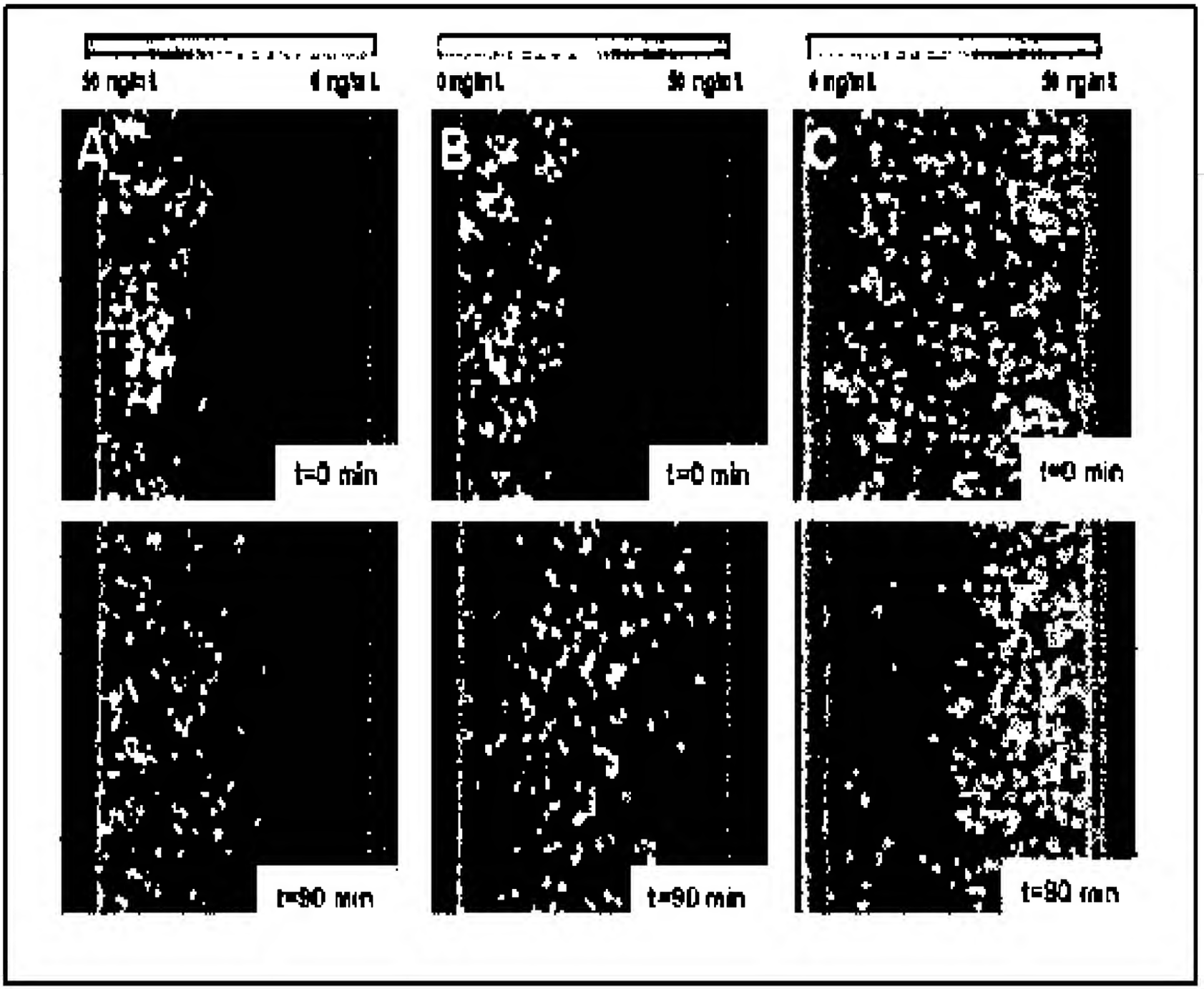



Figure 10

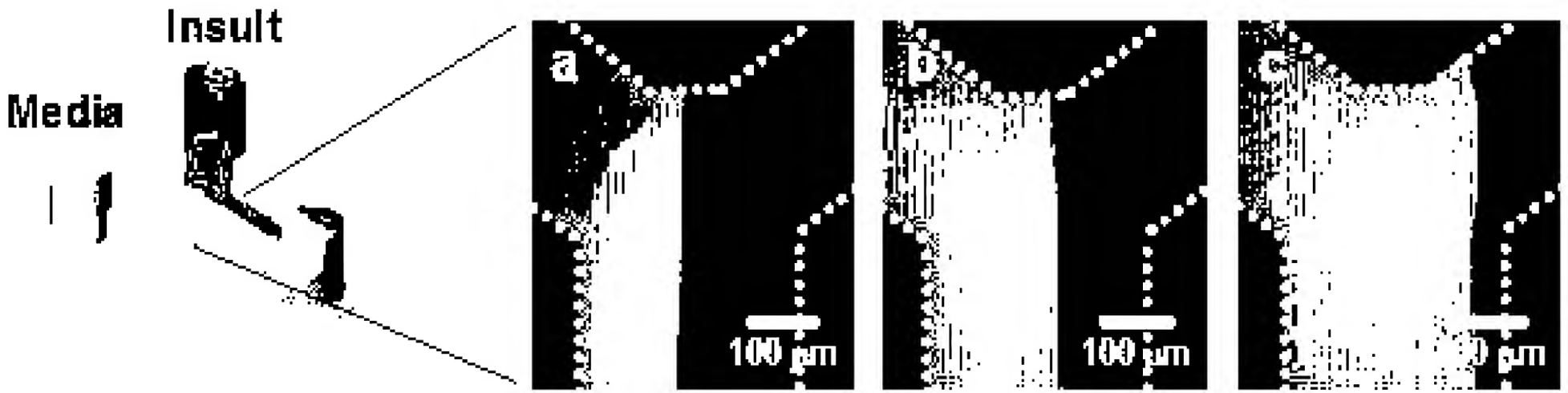



Figure 11

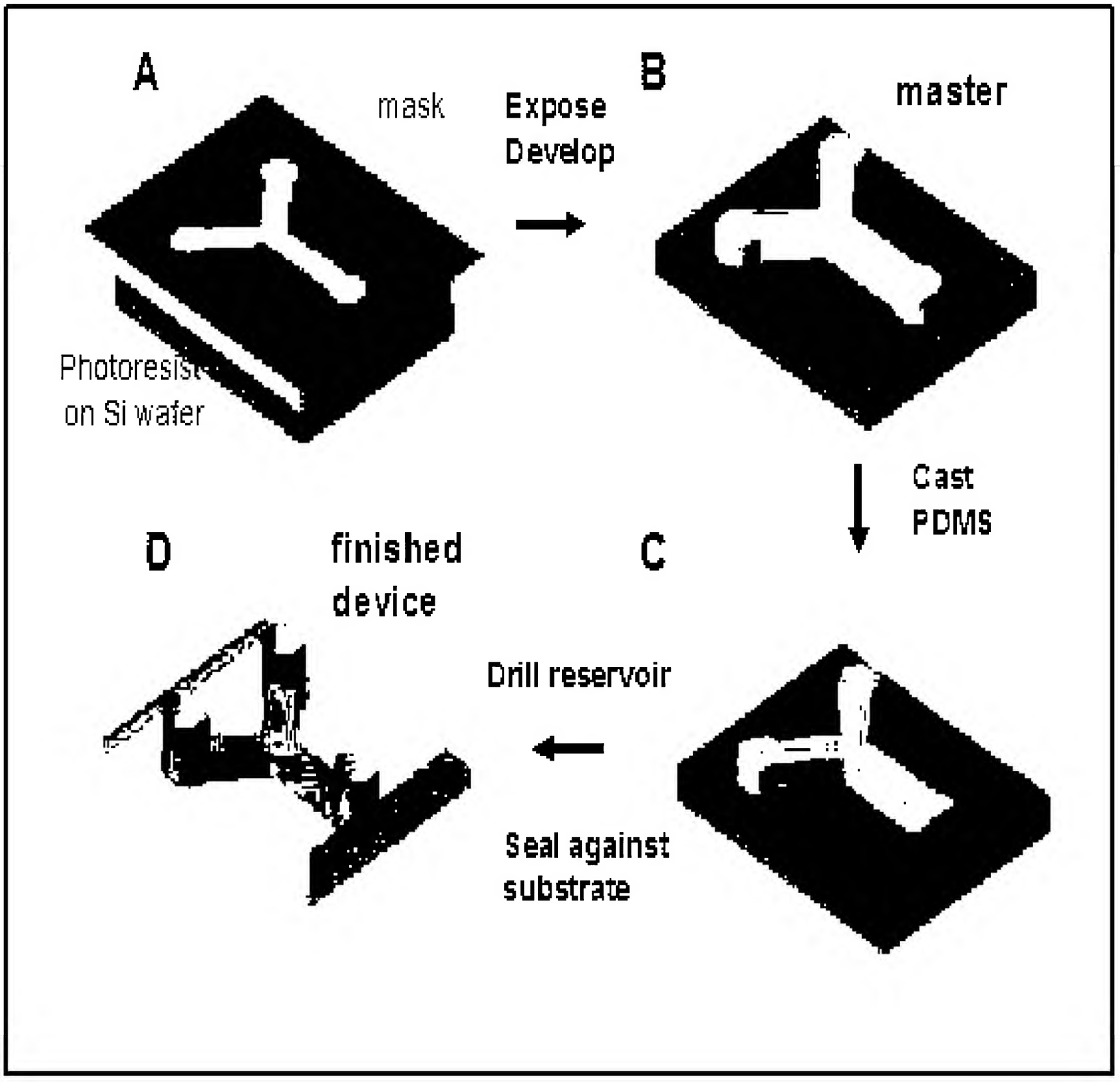

A
mask
Expose
Develop
B
master
Photoresist
on Si wafer
Cast
PDMS
D
finished
device
C
Drill reservoir
Seal against
substrate

Figure 12